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ABSTRACT

In academic contexts, self-sufficient learners engage autonomously in study activities that promote effective criterion performance. Their expertness in studying presumably increases as students develop and move from one educational level to another. A correlational investigation was undertaken to evaluate four hypotheses about differences across junior high school, senior high school, and college in the deployment and effectiveness of various categories of study activities. The Study Activity Survey and the Course Questionnaire were completed by students enrolled in a college level European history course (N=236), five senior high school courses in American history or government (N=229), and six junior high school courses in American history (N=222). The results indicated that across these educational levels: (1) students increasingly reported engaging in generative cognitive activities and planful self-management activities; (2) students judged their courses, in some respects, to increase in the demands they made and the supports they provided for engaging in such activities; (3) the greater the generativity of the cognitive activities engaged in, the greater their effectiveness in terms of grades received; and (4) negligible differences emerged in the tendency to match differential study-activity engagement to relative study-activity effectiveness. This last finding is interpreted as evidence against the proposition that expertness in studying increases with the educational level attained. (NB)

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Study-Strategy Effectiveness:

Student Expertness, Course Type, and Criterion Specificity[1]

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Abstract

Presented are the preliminary results of a correlational investigation designed to evaluate four hypotheses about differences across junior high school, senior high school, and college in the deployment and effectiveness of various categories of study activities. The results indicate that across these educational levels, (a) students increasingly report engaging in generative cognitive activities and planful self-management activities, (b) students judge their courses, in some but not all respects, to increase in the demands they make and the supports they provide for engaging in such activities, (c) the greater the generativity of the cognitive activities engaged in, the greater their effectiveness in terms of grades received, but (d) negligible differences emerge in the tendency to match differential study-activity engagement to relative study-activity effectiveness. This last finding is interpreted as evidence against the proposition that expertness in studying increases with the educational level attained.

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[2] The research reported was conducted in collaboration with the Director, John W. Thomas, and the staff, Robert Curley, Joanne Jensen, Anna Weiss, Lori Iventosch, Amy Strage, James Christopoulos, Burr Tyler, Morgan Walker, Elise Estrin, and Will Wilkinson, of the Autonomous Learning Center, Far West Laboratory for Educational Research and Development. We are grateful, for their help and assistance, to the participating students, instructors, and administrators at Albany Middle School, Albany High School, Burlingame High School, Crocker Middle School, El Cerrito High School, Hillsdale High School, Miramonte High School, Orinda Intermediate School, Piedmont High School, Portola Junior High School, Taylor Middle School, Walters Junior High School, Westmore High School, State University of California, San Francisco, and the University of California, Berkeley.

In academic contexts, self-sufficient learners engage autonomously in those study activities that promote effective criterion performance. They appraise the features of their courses, adjust their degree of engagement in different kinds of study activities accordingly, and consequently obtain higher grades than their less self-sufficient peers (cf. Pressley, Borkowski & O'Sullivan, in press). In short, self-sufficient learners are experts in studying.

Yet, as the title of this symposium suggests, such expertness presumably increases as students develop and as they make their way from one educational level to another. The expert junior-high school student, for example, may engage in different study activities than the expert high school or college student. If so, a large share of such differences may stem from corresponding differences in the features of the courses taken by junior-high, high school, and college students. These course differences, in turn, may make for corresponding differences across educational levels in the comparative effectiveness of particular kinds of study activities. Moreover, expertness itself, gauged by the degree of match between the effectiveness of different study activities and the incidence of students' engagement in them, may increase across educational levels.

A restatement of these conjectures yields four hypotheses about developments across educational levels in the character and effectiveness of the study activities in which students engage. Furthermore, a correlational investigation we have been conducting over the past two years provides a preliminary test of the hypotheses. The students who participated in this investigation were those enrolled in a college level European history course (n = 236), five senior-high school courses in American history or government (n = 229), and six junior-high school courses in American history (n = 222). Information about the study activities of these students was elicited by the administration of a self-report instrument, the Study Activity Survey. The Survey, consisting of 169 Likert-type items, is divided into two-sections and yields scale scores used to index variations in the incidence of 13 categories of study activities. These categories, named and characterized in Table 1, pertain

to activities engaged in either during or outside of course meetings, and that serve either cognitive or self-management functions. The items in one section of the Survey, Section T, pertain to activities engaged in to prepare for examinations, whereas those in the other section, Section R, pertain to activities engaged in routinely. In each course, section T was distributed during the class meeting immediately following a major examination, whereas section R was distributed no fewer than two weeks prior to such an examination.

Information about the features of courses was obtained from four sources. Student participants were administered the 75-item Course Questionnaire, which yields a variety of scales of course features intended to reflect demands and supports for student engagement in the categories of study activities indexed by the Study Activity Survey. Participating instructors completed a parallel version of this instrument, the Teacher Questionnaire, and supplied project staff with copies of all course documents and lists of examination and term grades. These documents, including texts, ancillary materials, and examinations, after being coded and rated in terms of demands and supports, constitute the third source of information. The fourth comes from classroom observations. In every course, project staff made observations during two routine class sessions and during the class session immediately preceding the major examination of interest. The resulting tape recordings and detailed notes of the events that took place are being coded and rated with reference to a framework parallel to that applied to course documents. Unfortunately, data from only one of these sources, the Course Questionnaire, have been analyzed. Thus, in this report, student judgments are the sole index of course features.

Study Activity Engagement

The first of the hypotheses to be tested against this set of data stems largely from research on the development of cognitive strategies during adolescence (see, e.g., Brown, Bransford, Ferrara & Campione, 1983). This hypothesis asserts that the incidence of engagement in generative study activities and in planful self-management activities increases across the educational levels that bracket the period of adolescence. The expected

trend in cognitive activities is away from forms of processing that non-selectively register and recirculate information to forms that selectively elaborate and integrate it with prior knowledge.

To test this hypothesis, engagement was indexed in terms of scores on the scales of both sections of the Study Activity Survey. Means of these scores were computed for each of the three educational levels and were subjected to analyses of variance. Table 2 contains a comprehensive display of the results and, more comprehensibly perhaps, Figures 1 and 2 depict the means for those scales, on sections T and R respectively, that were associated with significant differences across educational level.

Consistent with the hypothesis, scores increase as a function of educational level on six of the scales, namely, Generation of Integrated Information, Focus on Test Relevance, Hyperprocessing, Selective Notetaking, and the two self-management scales (Figures 1A and 2A). Also in keeping with the hypothesis are the significant decreases with educational level in the self-reported incidence of engagement in the activities of Duplicative and Receptive Processing (Figures 1B and 2B). Contrary to the hypothesis, however, are the significant decreases for the scales, Generation of Verbatim Information, Generation of Interpreted Information (Figure 1B), and Prereading Preparation (Figure 2B). The scale scores for Generation of Verbatim Information not only decrease but also reflect exceptionally low rates of engagement at all levels. As the items on this scale pertain to the use of imagery and elaboration strategies to promote memory, this finding is notable in that it contrasts with the results of numerous laboratory investigations of such strategies (some of them conducted by me, e.g., Rohwer, 1973). Nevertheless, according to the second hypothesis, all of these outcomes, whether or not they are consistent with the first hypothesis, should be explicable in terms of course features.

Differences in Course Features

The second hypothesis asserts that across levels, courses increasingly demand and provide support for engaging in generative cognitive activities and in planful activities of

time and effort management. Pertinent to this hypothesis are the lists in Table 3 of course demands and supports that, according to student judgments, either increase or decrease significantly with educational level. The pattern of these course features leads to a mixed tentative verdict about the viability of the present hypothesis. On the one hand, for example, the increasing demands and supports for the integration of information match the increasing incidence of engagement in study activities that involve the generation of such information. Similarly, the decreasing demands for detailed and verbatim information fit with the decreasing incidence of engagement in study activities that promote duplicative and receptive processing. On the other hand, the decreasing demands and supports for information selection seem at odds with the increasing incidence of engagement in selective notetaking. The status of the second hypothesis, then, remains in doubt pending the analysis of information about course-feature changes across levels from sources in addition to student judgments. Furthermore, additional caution is required in interpreting the present results in view of the marked course-to-course variation in deamnds and supports within educational levels. The range and character of this variation, however, is a story for another day.

Study Activity Effectiveness

The third hypothesis asserts that the comparative effectiveness of more generative study activities and more planful self-management activities increases across educational levels. This hypothesis, however, is qualified by a stipulation contained in the Autonomous Learning Model proposed by Thomas and Rohwer (1986), as well as in models proposed by other investigators (cf. Anderson & Armbruster,1982), that the effectiveness of particular study activities varies as a function of their congruence with course demands.

In the case of the present data set, this stipulation can be applied by relating the demands listed in Table 3 to the trends in the effectiveness of test-preparation and routine preparation activities displayed in Figures 3 and 4, respectively. In doing so, of course,

one must be mindful of the fact that information about these demands is limited to student judgments of them. The index of effectiveness in these figures is the same as that in Table 2, namely, the correlations of the Survey scales with examination (test-preparation activities) or term grades (routine preparation activities).

The only clear prediction to be derived from the increasing demands listed in Table 3 is that the effectiveness of engaging in the generation of integrated information should increase across educational levels. An inspection of Figures 3A and 4A reveals some descriptive confirmation of this prediction. Although none of the test preparation activities exhibit increased effectiveness across levels, those involving the generation of integrated information so. Thus, not only does the incidence of engagement in such activities increase, so also does their effectiveness. The other increasing trend shown in Figure 4A, however, that for uniform processing activities, is not predictable from cross-level differences in student judgments of course demands. Moreover, and equally unpredicted, is the decline in the effectiveness of these activities for test-preparation (shown in Figure 3B).

A number of predictions can be made from the list of decreasing demands shown in Table 3. (a) The decreasing difficulty of, the decreasing number of details in, and the increasing interest level of the information to be learned, coupled with the decreasing importance of absolute achievement criteria, would be expected to place a declining premium on hyperprocessing and assiduous effort management activities. These expectations are corroborated by the decreasing effectiveness of these activities shown in Figures 3B and 4B. (b) The decrease in demands for the reproduction of verbatim information would be expected to result in declines in the effectiveness of duplicative processing, receptive processing, and the generation of verbatim information. Except for the last of these kinds of activities (and this outcome may be explicable in that the overall incidence of engagement was quite low), the trends exhibited in Panel B of each figure are consistent with these expectations. (c) The decrease across levels in the importance of

examinations in determining grades received would be expected to decrease the effectiveness of a focus on test-relevant information, especially for the relationship between routine preparation and term grades. As Figure 3B shows, this expectation is confirmed, but the decline shown in Figure 4B appears to be even more pronounced for examination grades. Not predictable from the demand information are the decreases in the effectiveness of uniform processing shown in Figure 3b. This third hypothesis, then, appears both to have potential predictive power and to be in need of further refinement.

Development of Expertness in Studying

The last of the present hypotheses asserts that while expertness in studying varies within educational levels, it varies across levels as well; that is, differences from junior high school to college in the incidence of engagement in different study activities should increasingly mirror the relative effectiveness of these activities. To evaluate this hypothesis, the Study Activity Survey scale score means for each educational level, the index of engagement, were plotted as a function of the correlations between scale scores and grades received, the index of effectiveness. These plots, idealized by least-squares estimates, are shown in Panels A and B of Figure 5 for test preparation and routine preparation activities respectively. As an inspection of the figure indicates, by the present definition, the relationships depicted provide virtually no evidence of an increase across levels in study expertness. In the case of test-preparation activities (Panel A), this finding might be attributed to range restrictions in the college sample, but this interpretation appears doubtful in the case of routine preparation activities. The hypothesis cannot, of course, be rejected on the grounds of this one finding. Alternative means must be used to index effectiveness, engagement, and expertness itself before a firm conclusion can be reached.

Meanwhile, the present results can be summarized in four statements. (1) The incidence of engagement in integrative and planful study activities increases across educational levels from junior high school to college. (2) These and other differences in study-activity engagement are related, in part, to corresponding differences across these

levels in specific course features. (3) These feature differences are also associated with increases in the effectiveness of certain kinds of study activities, such as the generation of integrated information, and with decreases in the effectiveness of others, such as duplicative processing. (4) Finally, taking into account the changes across levels in course demands and supports, junior-high school students appear to be as expert as college students in matching their engagement in different categories of study activities to the actual effectiveness of those activities in enhancing achievement.

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Table 1

NAMES AND CHARACTERIZATIONS OF STUDY ACTIVITY SCALES

Name	Characterization
Cognitive Scales	
Duplicative Processing	Unaltered re-encoding or mental recycling of previously encountered information.
Receptive Processing	Reception of information given in texts or by instructor without implication of further processing.
Generation of Verbatim Information	Elaborating or transforming mental modality of target information to enhance memorability.
Generation of Interpreted Information	Explicating, investigating, or inquiring into the meaning of target information to enhance comprehension or memory.
Generation of Integrated Information	Elaborating, reorganizing, contrasting, integrating, or summarizing newly encountered, previously recorded or encoded information.
Hyperprocessing	Self-initiation of extra processing of information that is anticipated to present comprehension or memory difficulties.
Uniform Processing	Non-selective processing of all the information at hand, voluntarily, intensely, or earnestly.
Cognitive Monitoring	Active checking of one's own state of comprehension or memory for information.
Focus on Test Relevance	Self-initiated investigation, identification, and allocation of processing to information that is likely to be important for a test.
Pre-Reading Preparation	Planning for selection prior to reading.
Selective Notetaking	Purposeful recording of information selected on criteria of difficulty or substantive relevance.
Self-Management Scales	
Assiduous Resource Management	Voluntary, intense, or earnest preparation for or application of one's energy to the task or activity at hand.
Means of Resource Management	Using specific procedures for managing time and effort in contrast to worrying about managing them.

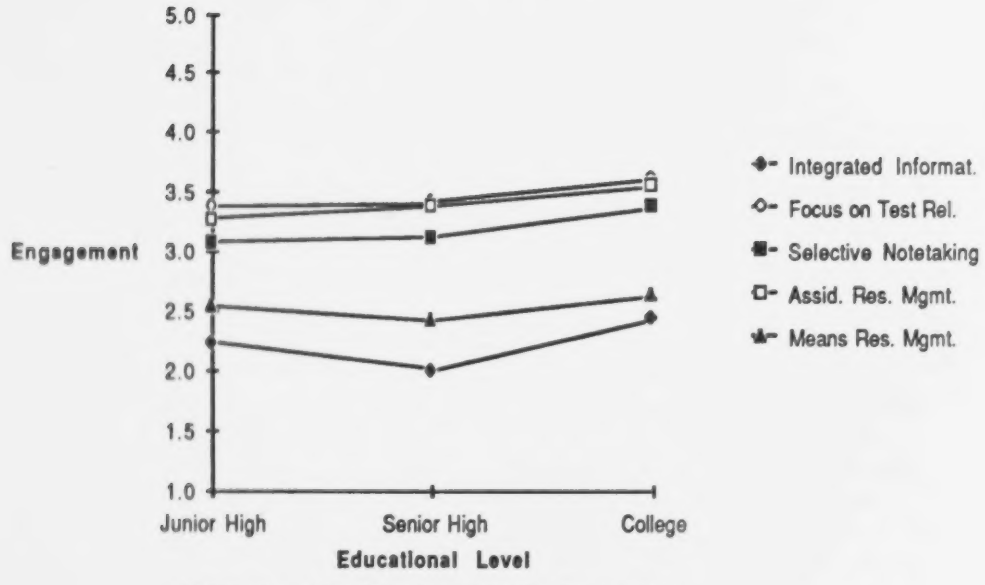
Table 2

Student Reports of Engagement in Study Activities as a Function of Effectiveness and Grade Level

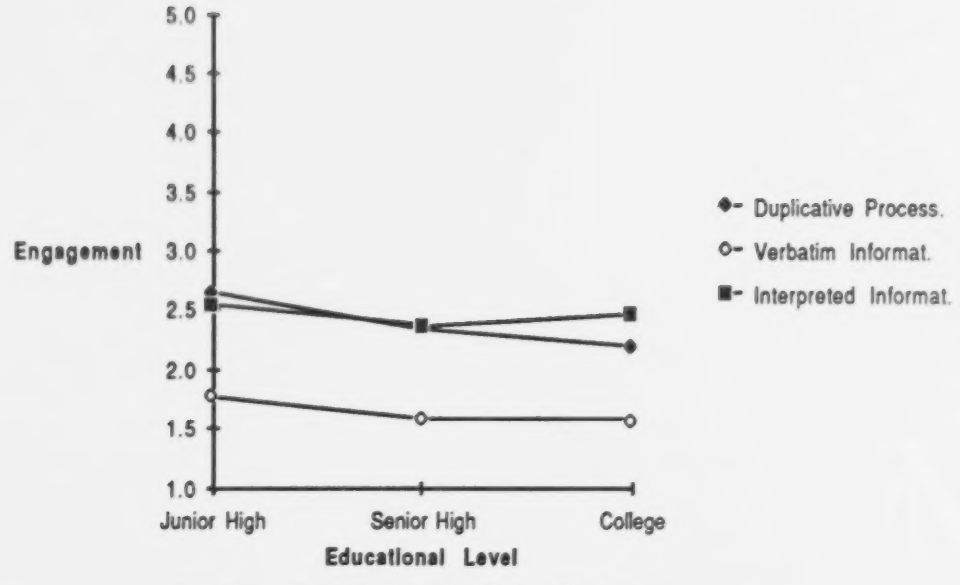
Scales	Section T			Section R		
Cognitive	J.H.	S.H.	Coll.	J.H.	S.H.	Coll.
Duplicative Processing						
Effectiveness	.02	.04	-.20**	.16*	.01	-.14*
Engagement	2.66	> 2.35	2.20	3.26	> 2.82	> 2.62
Receptive Processing						
Effectiveness	--	--	--	-.05	-.17*	-.14*
Engagement	--	--	--	3.04	3.07	> 2.92
Verbatim Information						
Effectiveness	-.06	-.05	-.06	--	--	--
Engagement	1.77	> 1.58	1.57	--	--	--
Interpreted Information						
Effectiveness	-.03	.10	-.11	.17*	.09	.13
Engagement	2.54	> 2.36	2.47	2.67	2.57	2.68
Integrated Information						
Effectiveness	-.14	-.07	.05	.10	.08	.16*
Engagement	2.24	> 2.00	< 2.44	2.6[illegible]	2.53	< 2.85
Hyperprocessing						
Effectiveness	--	--	--	.21**	.34**	.16*
Engagement	--	--	--	3.39	3.42	< 3.60
Uniform Processing						
Effectiveness	.30**	.29**	.05	.15*	.25**	.27**
Engagement	3.42	3.33	3.24	3.51	3.44	3.57
Cognitive Monitoring						
Effectiveness	.17*	.34**	.05	.12	.11	.06
Engagement	3.23	3.23	3.35	3.08	3.17	> 3.05
Focus on Test Relevance						
Effectiveness	.19**	.30**	.06	.14*	.24**	.12
Engagement	3.39	3.42	< 3.62	3.17	3.23	< 3.31
Prereading Preparation						
Effectiveness	--	--	--	.00	-.06	-.10
Engagement	--	--	--	2.67	> 2.27	< 2.47
Selective Notetaking						
Effectiveness	.09	.18*	.02	-.02	-.08	-.07
Engagement	3.08	3.13	< 3.38	2.70	> 2.39	< 2.95
Self-Management						
Assiduous Resource Mgmt.						
Effectiveness	.21**	.20**	-.10	.26**	.32**	.14*
Engagement	3.29	3.39	< 3.56	3.43	> 3.24	< 3.41
Means of Resource Mgmt.						
Effectiveness	-.12	.00	-.06	-.09	-.01	-.06
Engagement	2.54	> 2.42	< 2.63	2.77	> 2.66	< 3.10
Sample Sizes	200	211	140	222	229	236

Note: * $p < .05$
** $p < .01$

Figure 1. Engagement in Test Preparation Activities

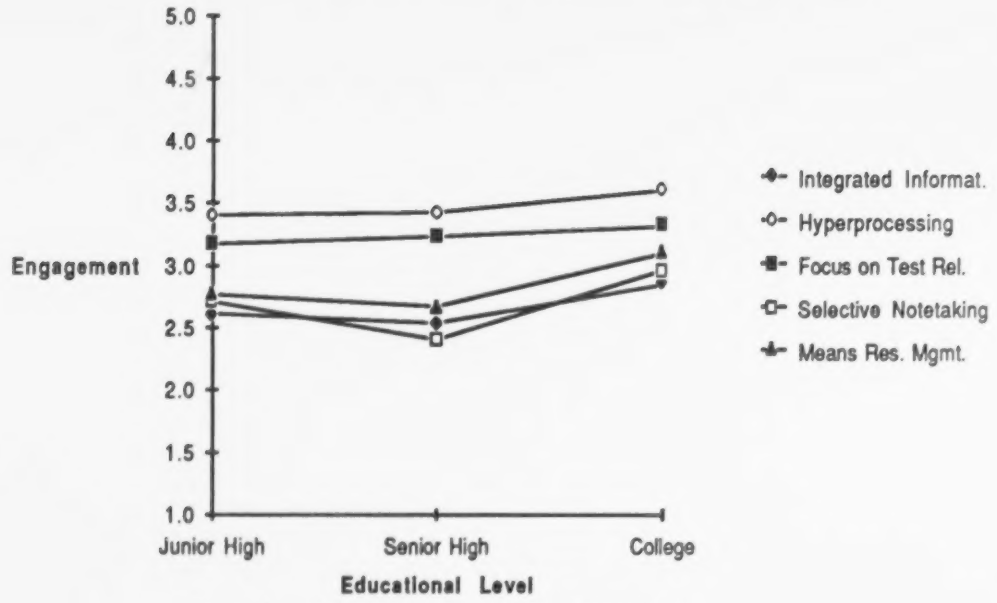


Panel A. Activities Increasingly Engaged In across Educational Levels

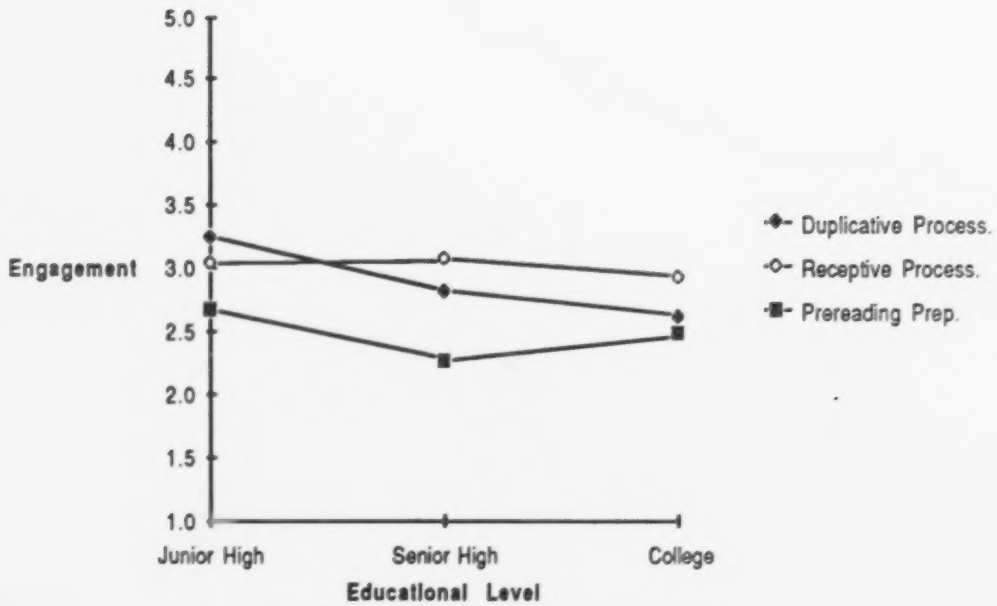


Panel B. Activities Decreasingly Engaged In across Educational Levels

Figure 2. Engagement in Routine Preparation Activities



Panel A. Activities Increasingly Engaged In Across Educational Levels



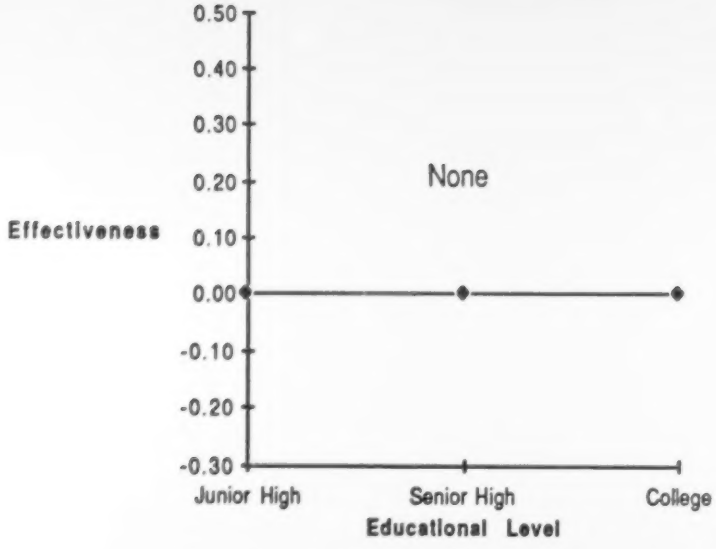
Panel B. Activities Decreasingly Engaged In across Educational Levels

Table 3

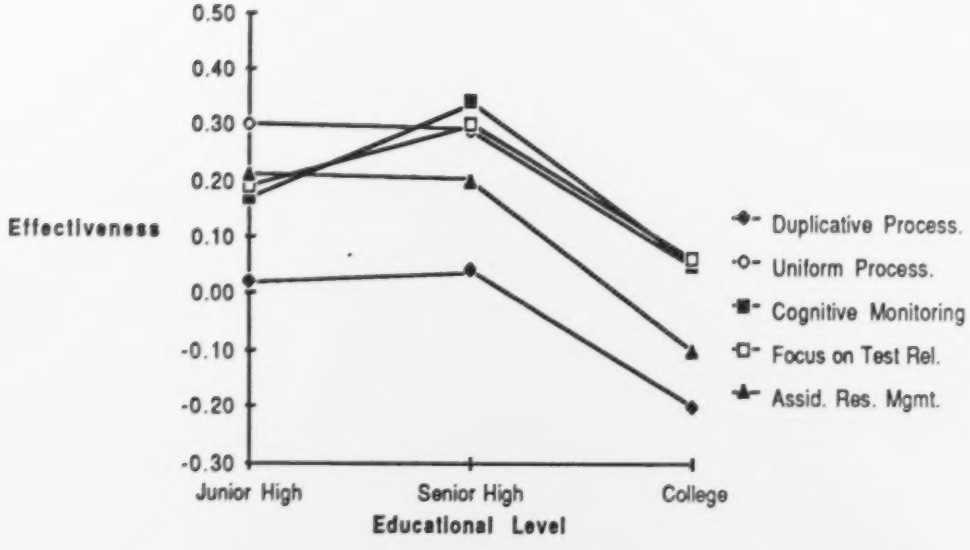
Changes across Educational Levels in Student Judgments of Course Features

Increasing Demands	Increasing Supports
Integrated Information	Integration Prompts
Competitive Achievement Criteria	Memory Strategy Prompts
	Interest Level of Information
Decreasing Demands	**Decreasing Supports**
Difficulty of Information Sources	Selection Prompts
Detail in Information Sources	Comprehension Aids
Verbatim Information	Prereading Previews
Examination Importance	Retrieval Practice
Absolute Achievement Criteria	

Figure 3. Effectiveness of Test Preparation Activities

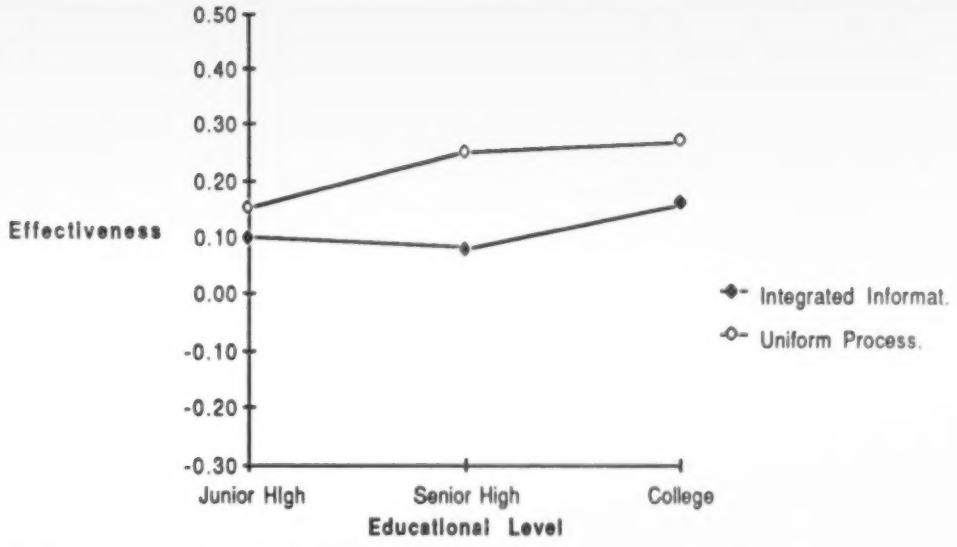


Panel A. Activities Increasingly Effective across Educational Levels

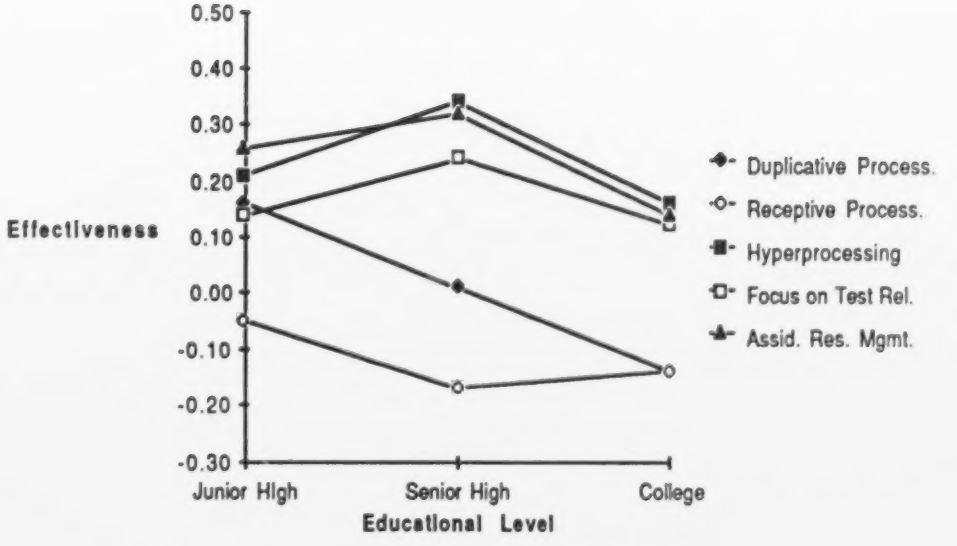


Panel B. Activities Decreasingly Effective across Educational Levels

Figure 4. Effectiveness of Routine Preparation Activities

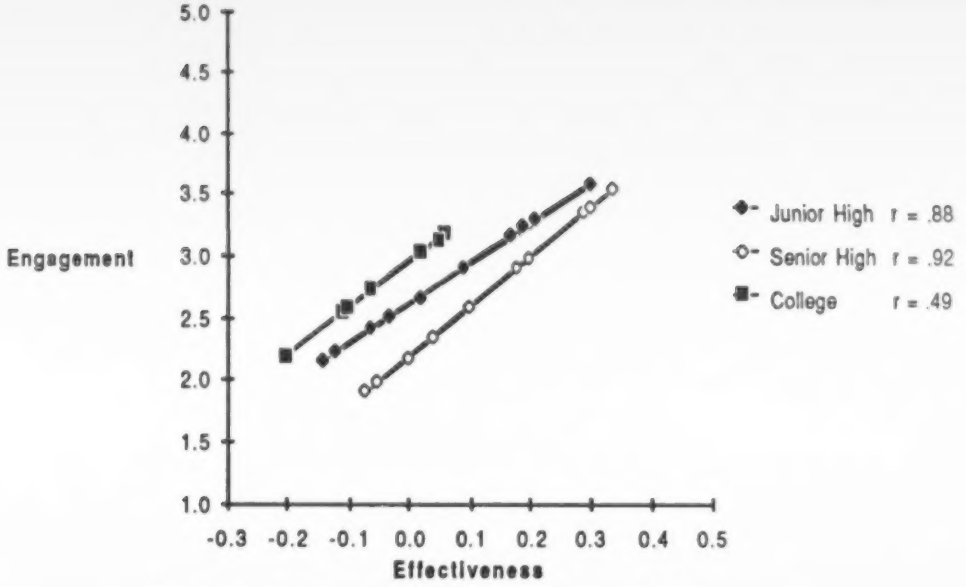


Panel A. Activities Increasingly Effective across Educational Levels

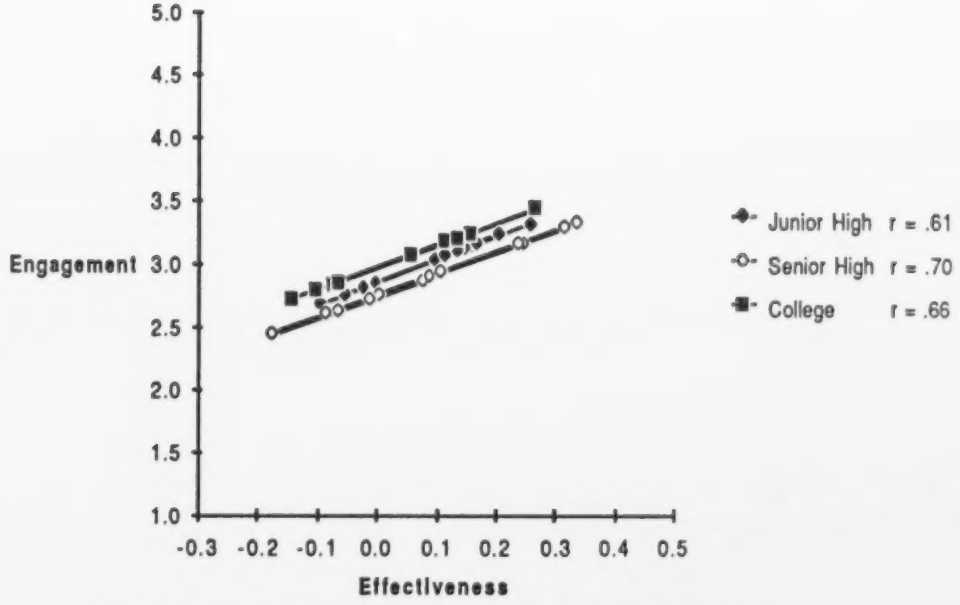


Panel B. Activities Decreasingly Effective across Educational Levels

Figure 5. Study-Activity Engagement and Effectiveness



Panel A. Engagement in Test Preparation Activities as a Function of Exam-Grade Effectiveness and Educational Level



Panel B. Engagement in Routine Preparation Activities as a Function of Term-Grade Effectiveness and Educational Level